LISTING OF CLAIMS

Claim 1 (Previously amended): In a multicarrier communication system in which a signal to be transmitted comprises data bits to be converted into a symbol modulated by each subcarrier of the signal prior to transmission on a channel, a method for minimizing a peak to average power ratio while minimizing introduction of errors into the signal to be transmitted, comprising:

sampling the symbols to be transmitted of a frame;

compare magnitudes of the samples of the frame to a predetermined threshold to determine whether sample magnitudes in the frame violate the predetermined threshold, the predetermined threshold being selectable to control the number of samples violating the threshold;

responsive to determining a sample magnitude does violate the predetermined threshold, applying a differentiable penalty function to the samples having magnitudes exceeding the predetermined threshold;

computing a net penalty function value, the net penalty function value responsive to the individual penalty function values computed for the samples having magnitudes exceeding the predetermined threshold;

computing a gradient vector responsive to the net penalty function value;

determining a direction of the gradient vector;

determining an upper limit correction value for each symbol, the upper limit correction value being selectable to control an amount of signal to noise ratio deterioration;

applying a correction to the symbols to be transmitted in a direction opposite to the direction of the gradient vector, the magnitude of the correction not exceeding the determined correction values for each symbol; and

transmitting the corrected symbols to the channel.

Claim 2 (Previously amended): The method of claim 1 wherein determining an upper limit correction value for each symbol, further comprises:

computing an interpoint distance between symbols;

selecting a correction value for a symbol as a value less than the interpoint distance to ensure that the symbol is not mistaken for other symbols.

Claim 3 (Original): The method of claim 1 wherein applying a differentiable penalty function to the samples having magnitudes exceeding the predetermined threshold comprises:

applying the function:

$$h(x[k]) = \begin{cases} (x[k]-T)^{2m} & if \quad x[k] \\ 0 & if \quad |x[k]| \\ (x[k]+T)^{2m} & if \quad x[k] \leq \end{cases}$$

where m is a positive integer that decides the severity of penalty, T is the predetermined threshold, x is the frame of data symbols expressed by: X = (r_0, $r_1 \exp(j\theta_1)$, $r_2 \exp(j\theta_2)$, …, $r_{N/2-1} \exp(j\theta_{N/2-1})$, $r_{N/2}$), where r_i and θ_i denote the magnitude and phase of symbol in channel i, and k is the number of the symbol.

Claim 4 (Original): The method of claim 3 wherein the net penalty function comprises:

$$f(x) = \sum_{k=0}^{N-1} h(x[k])$$

Claim 5 (Original): The method of claim 4, wherein the gradient vector is computed as:

$$\frac{\partial f}{\partial r_i} = \sum_{k=0}^{N-1} \frac{dh(x[k])}{dx[k]} \cos\left(\frac{2\pi ki}{N} + \theta_i\right); i \in \{1,\ldots,N/2-1\}$$
$$\frac{\partial f}{\partial r_0} = \sum_{k=0}^{N-1} \frac{dh(x[k])}{dx[k]}; \frac{\partial f}{\partial r_{N/2}} = \sum_{k=0}^{N-1} \frac{dh(x[k])}{dx[k]} \cos(\pi k)$$
$$\frac{\partial f}{\partial \theta_i} = -r_i \sum_{k=0}^{N-1} \frac{dh(x[k])}{dx[k]} \sin\left(\frac{2\pi ki}{N} + \theta_i\right); i \in \{1,\ldots,N/2-1\}$$

Claim 6 (Original): The method of claim 1 wherein the gradient vector is computed only as a function of the magnitude of the sample values.

Claim 7 (Original): The method of claim 1 wherein computing a net penalty function value comprises adding together the individual penalty function values computed for the samples having magnitudes exceeding the predetermined threshold to generate the net penalty function value.

Claim 9 (Cancelled)

Claim 10 (Cancelled)

Claim 11 (Cancelled)

Claim 12 (Cancelled)

Claim 13 (Cancelled)